

**ABSTRACT**

The invention relates to membrane pumps for delivering liquids. More specifically, a pump is provided having a pump housing with a pump cavity formed between first and second wall portions thereof, and an pump membrane pump membrane having first and second membrane surfaces arranged within the pump cavity, whereby a pump chamber is provided between the first wall portion and the first membrane surface, and an actuation chamber is provided between the second wall and the second membrane surface. Inlet means comprising an inlet valve in fluid communication with the pump chamber, and outlet means comprising an outlet valve in fluid communication with the pump chamber are provided. The pump membrane has a maximum volume position, and a drained volume position in which the first membrane surface in a stretched state abuts the first wall. To drive the membrane, actuating means for periodically shifting the pump membrane between the maximum volume position and the drained volume position is provided, thereby, in a situation of use, providing a flow of fluid.

**Documents cited in the application and are hereby incorporated by reference.**

5        • H. van Lintel et al. in "A piezoelectric micropump based on micromachining of silicon"  
            (Sensors and Actuators, 15, 1988, pp. 153-157)

10      • US patent 2,980,032

        • US patent 5,725,363

        • EP 1 177 802

15      • US patent 5,759,015

        • D. Maillefer et al, "A high-performance silicon micropump for disposable drug delivery  
            systems", Debiotec SA, Switzerland)

        • WO 98/01168

        • US patent 5,149,413

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**Documents for IDS**

• US patent 5,205,819